

**practice** between preemptive investment and efficient investment? Like all asymmetric regulation, such restrictions run the very real risk of creating large technical efficiency losses (in the broad sense of the term discussed in Section 1). An alternative policy would be to rely on interconnection to sever the link between market power in facilities and market power in service provision. If mandated interconnection at non-discriminatory rates could be enforced, service competition could be preserved even if investment preemption occurs. However, there are formidable practical problems with this approach which are discussed below. An effective and practical alternative is to condition the degree of regulatory streamlining on the presence of a competing facility in the relevant geographic market (See Section 4 for more discussion). The United States Telephone Association (USTA) has developed a proposal along these lines. (USTA's Petition for Rulemaking, Reform of the Interstate Access Charge Rules, RM-8356, filed by the United States Telephone Association, September 17, 1993)

The **vertical price squeeze** refers to a situation in which an integrated incumbent has monopoly control over essential facilities but faces actual or potential competition in service provision. Left unencumbered, the incumbent can squeeze the profit margin of nonintegrated service providers by suitably raising the price of interconnection to its facilities. If the squeeze is tight enough, it could deter low cost entry and create technical efficiency losses. For this strategy to deter entry, however, it is not enough that the incumbent currently monopolise facility provision. There must also be no effective **potential** competition in the supply of facilities. Otherwise the incumbent will not have enough market power in setting interconnection rates to deter entry. This requirement limits the scope for vertical price squeeze, especially with the enhanced technological flexibility in providing transport and switching functions (see notes 16 and 23).

The most direct way to prevent a vertical price squeeze is to enforce mandated interconnection at non-discriminatory rates (at least in geographic markets where there is a

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Delays are substantial - these applications were filed between December 1992 and January 1994. Leading examples of indirect restrictions include limits on downward price flexibility, various restrictions on nonlinear pricing design, and the rules governing the allocation of broadband facility costs to voice, data, and video services.

single facility provider). While feasible in theory, this policy would require ongoing Commission involvement in the determination and supervision of interconnection rates. Because it places the full weight on this single policy instrument, the determination of the interconnection rate becomes critical. If the rate is set too high it may prevent efficient entry, if too low it creates price umbrellas for inefficient entry. Both errors run the risk of technical efficiency losses. To set the entry-neutral interconnection rate requires an appropriate imputation for the contributions embedded in existing service prices. This is a difficult administrative task, especially in a multiproduct setting with nonlinear price schedules. Moreover, if the Commission chooses to set an imputation which is uniform across services and consumers for practical reasons, there may be large allocative efficiency losses. The reason is that any uniform imputation imposes a constraint on the nonlinear price schedules common in this industry and therefore limits the allocative efficiency gains associated with such pricing. In order to avoid these efficiency costs and implementation problems with mandated interconnection, the Commission could require that some facilities competition be present before authorising regulatory streamlining in that geographic market (e.g., removal of restrictions on pricing flexibility). The costs and benefits of this approach are discussed more fully in the section on access reform.

**Predatory pricing** is a strategy to induce exit of competitors. If it succeeds, it may serve as a signal which deters potential entry as well. The standard economic definition is that a firm predates when it sets price below its short run marginal cost (incurring losses on marginal units), in order to impose losses on competitors and drive them from the market. It is important to emphasise that it is **not** predatory to price below the short run marginal cost of high cost competitors, even though that drives them from the market. This is the essence of price competition that ensures technical efficiency. In theory, predatory pricing can be employed by any firm with a protected and profitable market (or other source) to fund the short run losses, not just an incumbent LEC. Predation may enable an incumbent to deter socially efficient entry by pricing below the marginal cost of a more efficient entrant. On the other hand, it can also enable an entrant to induce the socially inefficient exit of a more efficient incumbent. Predatory pricing can create both types of technical efficiency

losses, and one requires a symmetric approach to prevent its use by incumbents and entrants.

In order for predatory pricing to be a rational (i.e., long run profit maximising) strategy for any firm, however, it must enable the firm to **establish and maintain** market power so that it can recoup the short run losses and earn monopoly profit.<sup>8</sup> Predatory pricing will be ineffective unless there is some barrier to entry that permits sustainable market power after predation.

The structural conditions (technology and demand) in telecommunications make it unlikely that predation will be an effective exit-inducing strategy, especially with open network architecture, unbundling and mandated interconnection. Consider first the case where the competitor owns transport facilities. Fiber optic cable (and other transport modes) have very large carrying capacity, are capable of delivering a range of different services, and are to a substantial degree sunk costs. These characteristics strongly suggest that markets for individual products should be close to contestable, given accessible transport facilities (see Section 4 for more discussion). Predation by an incumbent in a given service market will not be effective because it will not enable the firm to acquire and maintain any market power. Predatory pricing may temporarily discourage the competitor from providing that particular service, but the transport facility remains and will be used to deliver other services (both through internal provision and interconnection). If the incumbent tries to recoup predation losses by raising price, it will induce re-entry into that service market relatively quickly. Contestability of **product markets** renders predation

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<sup>8</sup> For a game theoretic discussion of predatory pricing, see Jean Tirole, *op. cit.*, Chapter 9 and the extensive literature cited there. The standard reference for legal standards is Paul Areeda and Donald Turner, "Predatory Pricing and Related Practices under Section 2 of the Sherman Act," Harvard Law Review (1975) 88: 697-733. The conventional definition of predation has been criticised as too narrow because it misses various forms of strategic pricing behavior by incumbents that are designed to induce exit of competitors and would not be profitable in the absence of such exit, even though no short run losses are incurred. See Janusz Ordover and Robert Willig, "An Economic Definition of Predation: Pricing and Product Differentiation," Yale Law Journal (1981) 91: 8-53. This alternative definition has its own theoretical limitations (prices that increase technical efficiency by driving out high cost producers may be judged predatory), and it is extremely difficult to implement. It has not influenced legal practice to date.

ineffective. The same argument applies where there is monopoly control over facilities, provided that service competitors have access to these facilities at non-discriminatory rates.<sup>9</sup>

Even if predatory pricing were a viable strategy, there is no need for asymmetric regulation to redress it (e.g., limitations on downward price flexibility of incumbents). The problem of predation is "prices too low." The appropriate regulatory response is to put in place and enforce price floors based on incremental cost (or some suitable proxy). This safeguard should apply equally to all firms in the market, not just incumbents. It should also be emphasised that all firms, including regulated local exchange companies, are subject to antitrust sanctions against predatory behaviour and are liable to substantial civil damages if convicted. As transition to full competition in local exchange markets is completed, these legal sanctions should serve as the exclusive safeguard against predation.

The last strategy analysed is **cross subsidisation**. The technical definition of cross subsidisation is provision of a service for which the incremental revenue at current prices is less than the incremental cost at the current volume, taking into account cross elasticities of demand and cost complementarities.<sup>10</sup> This is essentially the multiproduct generalisation

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<sup>9</sup> To preserve the contestability of product markets, interconnection service must be unbundled and rates set so as not to discriminate between external service providers using the transport facility and the integrated facility owner. The Commission recently moved in this direction for special access and switched transport interconnection. See Expanded Interconnection with Local Telephone Company Facilities, CC Docket No. 91-141, Report and Order, 7 FCC Rcd 7369 (1992); and CC Docket No. 91-141, Second Report and Order, FCC 93-379 (released September 2, 1993). There are practical limitations to this policy approach, discussed in Section 2 of the text.

<sup>10</sup> See Gerald Faulhaber, "Cross Subsidization: Pricing in Public Enterprises," American Economic Review, vol. 65, no. 5 (December 1975), 966-977. Faulhaber develops two price bounds that define the set of subsidy-free prices: the lower bound given by the generalised incremental cost test stated in the text, the upper bound given by the stand-alone test. For analysing the entry deterrence potential of cross subsidisation, only the lower bound is relevant. It should be noted that the term cross subsidisation is often used more loosely to refer to any elevation of prices for services where a firm has market power to underwrite price reductions in another market subject to competition, regardless of whether the lower bound is violated. The policy to prevent cross subsidisation described in the text also resolves cases under this broader definition.

of predation, and the same observations I made about predation as an entry deterrence strategy apply to cross subsidisation. Two points deserve reiteration: (i) both multiproduct incumbents and entrants can use the strategy,<sup>11</sup> and (ii) the firm must be able to create and maintain market power in the cross subsidised market in order for the strategy to be effective. As discussed under predation, the contestability of **product markets** (given accessible facilities) is likely to make cross subsidisation an ineffective entry deterrence strategy.

Even if cross subsidisation were a real threat, it does not warrant asymmetric regulation. The most effective policy to minimise the risk of cross subsidisation is: (i) to undertake access reform that segregates geographic markets and imposes separate price caps according to the extent of competition (see Section 4 for more discussion) , and (ii) to eliminate the sharing and low-end adjustment mechanisms. Access reform of this type delinks price determination in monopoly and competitive markets (for each service basket) and thereby removes the opportunity for entry-detering cross subsidisation. With the elimination of sharing and the low end adjustment, there is no need to compute trigger rates of return and no incentive or ability of the LEC to engage in strategic cost allocation.

### **3. Transition to Competition: Integrated Reform**

It may be helpful to view the process of regulatory reform in the context of a two-stage strategic game played by incumbent LECs and other firms providing local exchange facilities and services. Suppliers include competitive access providers, interexchange carriers, cable companies, cellular, PCS, satellite providers, electric utilities, and large end users who can internalise various functions of the switched network. Firms supply differentiated products (there is imperfect substitution on the demand side). In the first stage, potential suppliers make independent (noncollusive) decisions whether or not to

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<sup>11</sup> It is likely that potential entrants into interexchange access (and local exchange) markets will be large firms with operations in other product markets, such as cable television and electric power companies.

enter a particular market. The entry decision typically involves a sunk investment cost, such as construction or extension of optical fiber transport facilities which may not be fully recoupable upon exit. In the second stage firms engage in price competition, given the production capacities which are determined at the first stage. The entry decision is based on expected profits, and hence depends on the firm's expectation of the competitive conditions that will prevail at the second stage.<sup>12</sup>

This conceptual framework, like any abstraction, is a simplification of the ongoing competitive process, but it highlights a very important point.<sup>13</sup> In this framework the entry decision is governed by two basic factors: the magnitude of sunk investment costs and the intensity of competition at the second stage. Therefore, **any regulatory restrictions that constrain the competitive game in the second stage will affect the entry decisions at the first stage.** The most important examples are the limitations on downward price flexibility by incumbent LECs, Part 69 tariff procedures which substantially delay introduction of new services, and existing indirect methods to fund universal service obligations that impinge asymmetrically on incumbent LECs. These asymmetric regulations distort entry signals and induce capital investment decisions based on factors unrelated to relative efficiency levels. The regulations provide protective umbrellas that create opportunities for privately profitable but socially inefficient entry. Technically inefficient suppliers may be induced to enter and be sustained by the artificial protective umbrellas created by asymmetric regulation. As pointed out in Section 1, the term efficiency here relates to multiple dimensions of economic performance extending beyond

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<sup>12</sup> Two remarks are in order. First, in practice firms compete at the second stage both in terms of prices and, increasingly important, the introduction of new services. Entry decisions will be influenced by firms' expectations regarding regulatory restrictions on pricing flexibility and the introduction of new service. Second, the entry decision often involves sunk costs by customers as well as suppliers, such as dedicated internal facilities and idiosyncratic skill acquisition. These are broadly known as "customer switching costs." Technical efficiency losses from high cost, protected entry must include these affiliated investment costs as well.

<sup>13</sup> This type of two stage dynamic game framework is commonly used in the academic literature to analyse entry and imperfect competition. See for example Jean Tirole, op. cit., and John Sutton, Sunk Costs and Market Structure (Cambridge: MIT Press, 1992).

simple unit production cost. The associated technical efficiency losses represent an important, though hidden, waste of social resources in the construction of the modern information infrastructure.<sup>14</sup>

This line of reasoning has an important policy implication. In order to avoid distorted entry signals and a socially inefficient pattern of entry, the Commission needs to move boldly now to formulate the broader regulatory framework governing competition. In the NPRM (para. 34), the Commission states its intention to determine how revisions in the price cap plan can promote development of an advanced national information infrastructure. The key is to design regulation which ensures that appropriate price signals guide private investment decisions. The Commission (NPRM, para. 92-100) identifies a set of "transition issues" which includes: criteria for streamlined regulation, definition of transition stages, competition-induced revision of price cap basket definitions, revision of monitoring of service quality, network reliability, frequency of regulatory review, and other assorted issues. These issues (especially the first three) encompass the critical rules that will govern competition between LECs and alternative suppliers, and thereby influence current entry and investment decisions. Yet, these transition issues are scheduled to be addressed in the revision of the baseline price cap model **as competition develops** (NPRM, para. 94, emphasis added). I urge the Commission not to postpone resolution of these issues, including access reform, until some later date.

#### 4. Price Cap Reform

In response to Baseline Issues 2 and 8 (NPRM, para. 42 and 83), this section briefly discusses some principles that should guide access reform and relates them to the basic theme of regulatory symmetry. The discussion is not intended to provide detailed recommendations at this stage.

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<sup>14</sup> As long as such umbrellas exist, the fact that new entry successfully erodes the market share of incumbents does not mean that the level and composition of the new investment is socially efficient. Ex post success is an indication of relative efficiency only if price signals are meaningful and restrictions are symmetric.

The current LEC price cap plan has two key features. First, the definition of price cap baskets (and their subgroups) is based largely on product-oriented categories. Recent proposals by the Commission for access restructuring increase the number of subgroups and underline this orientation.<sup>15</sup> The second feature is that the plan imposes the same limited degree of pricing flexibility and procedures for introducing new services in all geographic areas. While the recent adoption of rate zones [see citations in note 9] provides for rate deaveraging **between** broad geographic areas, it does not introduce greater pricing flexibility **within** zones.

The access rate structure was established in 1983, at a time when there was virtually no competitive provision of access services, but it has largely been overtaken by recent technological developments in transport and switching that have intensified competitive provision. Besides reducing the cost of providing services, these developments have sharply increased the "supply cross elasticity" in the delivery of access services. It is now possible to satisfy the same functional requirements of end users by a variety of technical means, including recombinations of existing "products."<sup>16</sup> This makes

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<sup>15</sup> Under rules ordered and proposed by the Commission, the traffic sensitive basket will include subcategories for local switching, information, billing name and address database, 800 vertical services, and operator services. The trunking basket includes (*inter alia*) tandem, voice grade, high capacity, audio/video, wideband, and interconnection. The transport structure is contained in Transport Rate Structure and Pricing, CC Docket No. 91-213, Second Report and Order, 9 FCC Rcd 615 (1994).

<sup>16</sup> There are many illustrations of this supply cross elasticity. First, there is substitution between CPE and switched network functions. For example, the same end user demand can be satisfied by Centrex service from the LEC central office or by PBX on the customer premises. Second, end users can substitute dedicated links for switched network services. Megacom-type services substitute special access for switched transport. More generally, customers with large interstate switched service volumes can sort and direct local and long distance traffic by using flexible combinations of switched local loops, switched transport facilities, PBX and other CPE, and dedicated links to the IXC office. On the other hand, switched network facilities can also substitute for dedicated links. The leading example is virtual private line service. Virtual private line does not fit very well into a classification system that segregates services into "switched" and "special," and is a good illustration of the rigidity of product-oriented boundaries. Third, simple voice communications can be provided by cellular in place of the LEC switched network, and cellular modems extend this capability to data connections for portable computers. PCS and cable networks will also provide these functions.



the traditional product-oriented boundaries in the current price cap plan increasingly obsolete. New services often do not fit the rigid classifications, and this has led to the proliferation of narrow product subcategories within price cap baskets that has characterised incremental access reform to date. There is an urgent need to undertake more fundamental reform, defining access price cap baskets along **functional rather than product lines** in order to enable suppliers to exploit this technological flexibility in new and innovative ways.

The second problem with the current access structure is that there is no mechanism that links pricing flexibility and other forms of regulatory streamlining to the degree of competition in geographic submarkets. This is important because the intensity of competition varies widely across LEC markets at the present time.<sup>17</sup> Like all asymmetric regulation, these restrictions run the serious risk of inducing, and supporting, inefficient entry. What is needed is a mechanism that triggers deregulation in particular submarkets when effective competitive discipline exists in those markets. The key issue is how to determine when there is effective competition that warrants partial or full deregulation. The next section briefly discusses that issue.

It is useful to begin with the polar case of contestable markets. A contestable market is one in which the mere threat of entry fully constrains the behaviour of incumbent firms. This requires that a potential entrant be able to enter the market to exploit any transitory profit opportunity, without incurring any sunk entry or exit cost - so called "hit and run" entry. If the relevant geographic market is contestable, incumbent firms cannot exercise any market power and are forced to set economically efficient prices.<sup>18</sup> In this

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<sup>17</sup> Geographic variations in competition are themselves partly consequences of regulated price structures, especially geographic rate averaging and restricted price flexibility of incumbent LECs. In order to compete effectively, regulated firms need not only downward price flexibility (subject to appropriate price floors to safeguard against predation), but also the right to use various forms of nonlinear pricing schedules that are common among unregulated companies.

<sup>18</sup> Specifically, the resulting price structure is "constrained efficient" - *i.e.*, maximises allocative efficiency subject to the constraint that revenues cover total costs. Marginal cost pricing is a special case when there are no economies of scale or scope in production.

polar case, the number of incumbent firms and their market share is immaterial to the pricing outcome. At first blush, the conditions of the model would appear to make it inapplicable to telecommunications markets. After all, firms must incur some sunk costs to enter a new geographic market, primarily the cost of investment in transport capacity such as fiber optic cable. The correct conclusion to draw from this fact is that contestability does not apply well to specific geographic markets considered as a whole. However, because of the capacity and flexibility of broadband fiber and other modern transport facilities, any firm with access to transport facilities presents a potent and credible threat to product submarkets within that area. Access to transport facilities can be obtained either through direct ownership or mandated interconnection at non-discriminatory rates.<sup>19</sup>

The important conclusion is that **product markets within geographic markets** should be considered contestable for purposes of regulatory policy, provided either that there is a competing transport facility in the relevant geographic area or that mandated interconnection is enforced at non-discriminatory rates.<sup>20</sup> The competing transport facility need not be fiber - any transport mode capable of delivering services at comparable cost would suffice to ensure contestability. Note that the actual market share of incumbents in particular product submarkets within the geographic area is not relevant to this determination.

This line of argument suggests that the determination of effective competition should turn on the existence of competing transport capacity in the relevant geographic market.<sup>21</sup> It is important to note that this criterion does involve some risk of inducing high cost,

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<sup>19</sup> Recent Commission rulings have promoted open network architecture with unbundling and interconnection for special access and switched transport. See citations in note 9.

<sup>20</sup> This argument is analogous to the distinction between entry into the airline industry de novo, which involves considerable sunk investment, and entry into individual airline routes which does not.

<sup>21</sup> A similar requirement exists under the recently adopted framework for cable regulation. The presence of a second cable supplier ("overbuilding") in the relevant geographic market is one of the key requirements to treat the market as "effectively competitive" and trigger deregulation of rates.

socially inefficient entry. The reason is that, if deregulation is triggered by entry of the second transport carrier, this entry decision will be taken under the distorted entry signals provided by the price umbrella. However, this risk should not be substantial if potential entrants fully understand the ground rules that will govern post-entry competition and these rules are symmetrically applied to incumbents and entrants alike. It would not be rational for firms to enter under deregulation or symmetric regulation unless they could compete on efficiency grounds. This underscores the importance of my recommendation that the Commission undertake now to develop clear, symmetric regulations that will govern competition between incumbent LECs and alternative access suppliers.

As indicated earlier, the alternative approach is to rely on mandated unbundling and interconnection at non-discriminatory rates to break the link between market power over facilities and market power over services within a given geographic area. In theory this should work, but it is likely to create an unmanageable administrative burden because it would require ongoing FCC supervision and enforcement of access pricing in all geographic markets (see discussion in Section 2). Therefore, I propose that the Commission adopt a criterion for effective competition based on the presence of a second source of transport facilities in the relevant geographic market.<sup>22</sup>

In order to condition deregulation on the extent of competition, appropriate definitions of geographic and product market boundaries are required. I do not discuss this issue in detail here, but a few basic principles warrant comment. Given my emphasis on a second source for **accessible** transport facilities, the geographic market should be defined narrowly. The key question is how distant transport facilities can be from potential customers and still be accessible (at sufficiently low extension cost). In general this will depend on the spatial distribution of customers, the cost of extending fiber networks and other competing forms of transport facilities, and other factors. Clearly, markets defined at

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<sup>22</sup> This criterion may be overly stringent, because what is needed to ensure efficient pricing is that there be a second transport facility that can be extended to reach the relevant geographic market at sufficiently low cost. To be useful for policy purposes, this weaker criterion must be implementable and verifiable with the available information. The United States Telephone Association (USTA) has developed specific proposals for how this might be done.

the national, regional, and even municipal level are too broad to be useful. In its proposal for access reform, the USTA recommends wire centres as the appropriate geographic market. It is my view that wire centres are probably somewhat narrower than the true economic market, but it may be prudent to err in this direction since it produces a more conservative deregulation policy.

In contrast to the geographic market, the relevant product market should be defined very broadly for two reasons. First, transport facilities are highly fungible in terms of the range of services they can deliver, so that diverse product markets can be treated as virtually contestable once transport is accessible in the geographic market.<sup>23</sup> Second, there is now substantial supply "cross elasticity" that enables suppliers to cross traditional product market boundaries to provide functionally equivalent services (see note 16). Narrow product market definitions are not appropriate from an economic perspective and would subvert the potential for competition created by the new technological flexibility.

An entirely different approach for assessing the degree of competition is to use the incumbent LEC's market share as an indicator of market power. This has been proposed by several parties (e.g., "The Uneven Playing Field: Asymmetric Market Power Demands Asymmetric Regulation," Teleport Communications Group (March 1994), p.12) and is under consideration by the Commission (NPRM, para. 95). This approach is wrong on analytic grounds and creates perverse economic incentives that undermine efficiency. The core problem is that market share is not an appropriate or useful index of market power. From an economic perspective, market power is summarised by the price elasticity of demand facing a firm. The greater the elasticity of demand facing the firm, the less scope the firm has for independent pricing (market power). For a profit maximising firm, greater market power on this definition is equivalent to a higher price-cost margin.<sup>24</sup>

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<sup>23</sup> To cite two examples: (i) CAPs can use the same fiber to provide special access or dedicated switched transport, (ii) video services can be provided to the home by an existing cable network or broadband LEC switched network using fiber, fiber/coax, or perhaps fiber/copper.

<sup>24</sup> It is a well known result that a profit maximising firm, under uniform pricing, sets the markup of price over marginal cost (Lerner index of market power) equal to the reciprocal of the price elasticity of demand it faces. This holds for monopoly and all models of imperfect

The **fundamental factors** that determine the price elasticity faced by a firm are the price elasticity of industry demand and the pattern of efficiency levels (marginal costs) across firms. When the distribution of efficiency levels across firms has a smaller variance (*i.e.*, firms are more similar in marginal cost), any given firm has less scope for discretionary pricing above marginal cost. Where does market share fit here? The market share of a firm is an **endogenous** variable and is determined by the same fundamental factors that govern market power. Market share does not cause market power any more than market power causes market share.<sup>25</sup> A variety of other factors may cause transitory movements in market share and market power. Regulatory policy, however, should be governed by long run economic considerations. The fact that market power and market share both reflect the underlying relative efficiency levels of all firms in the industry cannot be overemphasised. A policy which conditioned regulatory streamlining on the incumbent's market share would have the effect of penalising efficiency and commercial success, and would represent major retrogression from the recent provision of efficiency incentives under price caps.

Provided there are no artificial barriers to the entry and expansion of new entrants and incumbents, long run market share in a competitive game will be a reflection of the relative efficiency levels of different firms. Barriers can be created by asymmetric regulation, but they may also arise from certain restrictive trade practices of incumbent firms. In the telecommunications industry, the most important potential entry deterring practices are predatory pricing and vertical price squeeze. The appropriate regulatory policy is to design clear, enforceable rules to prohibit potentially entry-deterring trade

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competition. In the polar case of perfect competition, firms have no control over price (*i.e.*, infinitely elastic demand), and the price-cost margin is zero. Analytic results are more complicated under nonlinear pricing schedules.

<sup>25</sup> In many models of imperfect competition one can mathematically express the equilibrium price-cost margin as a function of the industry demand elasticity and the firm's market share. It is analytically incorrect, however, to interpret this as saying that market share is a (partial) determinant of market power. Market share is itself determined by the industry demand elasticity and efficiency levels. These are the basic determinants of market power and market share in all models of imperfect competition.

practices and to apply them symmetrically to all firms, incumbents and new entrants alike, but otherwise not to artificially constrain the competitive game by entry, pricing and other restrictions. The simple but key fact is that no one including the regulator can assess the relative efficiency levels of different suppliers ex ante. For this reason, regulatory policy must not be in the business of "picking winners," either by deliberate design or unintended consequence. Using the market share of incumbents to assess the competitiveness of a market would have precisely this consequence, and is bad public policy.

In summary, my recommendation is that the Commission should develop comprehensive access reform as part of the price cap revision process, based on the following principles: (i) adoption of functional rather than product oriented price cap baskets and (ii) criterion for effective competition based on the presence of an accessible second transport facility in the relevant geographic market, (iii) conditioning the extent of regulatory streamlining (including enhanced flexibility in pricing and tariffing of new services) on the degree of competition in the relevant geographic market, and (iv) adoption of narrowly defined geographic markets and broadly defined product markets for the determination of effective competition. Finally, the Commission should reject the use of market share criteria for assessing competition.

## **5. Universal Service and Regulatory Symmetry**

Universal service obligations are funded primarily through implicit subsidies in the price structure.<sup>26</sup> These obligations are an important source of asymmetric regulation because they apply to local exchange carriers but not to alternative service providers. In

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<sup>26</sup> A recent study estimates that switched access services to interexchange carriers (IXCs) and intraLATA message toll service provide a contribution (i.e., price above long run incremental cost) of roughly \$20 billion per year. (See Calvin Monson and Jeffrey Rohlfs, "The \$20 Billion Impact of Local Competition in Telecommunications," Strategic Policy Research, July 16, 1993.) This figure is an upper bound to the implicit subsidy because it also includes the difference between average and incremental cost arising from economies of scale and scope. There are also direct funding mechanisms that impose costs on LECs and IXCs unevenly (both ways). The argument for symmetric treatment in the text applies to all service providers.

the long run, competition that targets the high-value local exchange services will make these indirect subsidies unsustainable, and force either reform of the universal service funding mechanism (USFM) or abandonment of universal service objectives. In the meantime, however, the price structure creates price umbrellas and distorts investment signals. As with all asymmetric regulation, there is a serious danger of uneconomic entry and technical efficiency losses. The magnitude of indirect subsidies makes the potential efficiency losses particularly worrisome. In order to avert the potential for socially inefficient entry and misdirected investment, the Commission should initiate reform of the USFM as soon as possible.

There are two broad issues that must be considered: (i) how to fund universal service obligations, and (ii) how to select the universal service providers. In order to preserve appropriate market signals for investment, the Commission needs to replace indirect subsidies with a funding mechanism that is **supply-side neutral**. This means that the USFM must not distort entry (or exit) signals in favour of any particular set of firms or technologies. Neutrality requires some kind of "universal service tax" that is uniformly imposed on all telecommunication service providers.<sup>27</sup> This approach has the additional advantage of transparency - clearly identifying the economic cost of maintaining universal service obligations. One possible model is the scheme used by the Commission to recover the costs of providing interstate telecommunications relay services (TRS) mandated by Congress. This imposes a uniform percentage levy on the revenues of a wide range of service providers (which preserves the supply neutrality), compensates TRS providers

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<sup>27</sup> Two remarks are in order. First, the term "tax" is not meant to imply that the levy should be imposed by Congress as part of the annual budgetary process. Congress sets the general legislative mandate defining universal service, but funding mechanisms may be designed and implemented by the Commission. Second, from an economic theory perspective it is not generally optimal to set a uniform tax. Even in a static context where supply conditions are given, optimal markups (Ramsey prices) reflect the own and cross price elasticities of demand. In a dynamic context where supply is flexible (cross elastic) and evolving, the optimal markups are more complicated. In practice, the information needed to set optimal tax rates is unavailable and uniform rates are a reasonable alternative. Note that the USFM is treated here as a means to recover the costs of supplying "merit goods" which universal service obligations represent, not to efficiently price a consumption externality.

based on an average rate of interstate TRS minutes of use, and contracts out the program administration.<sup>28</sup>

The appropriate method to select universal service providers depends on the nature of the services under consideration. The key distinction is between services where single firm provision is deemed efficient (i.e., requiring dedicated setup costs) and those where multiple firm provision is efficient. In the first case (e.g., "carrier of last resort" obligations, and rural service provision), the Commission needs to develop a mechanism designed to select the efficient provider under asymmetric information - e.g., competitive bids for a time-bound universal service obligation. In order to provide incentives for the required infrastructure investment and maintenance, particular attention must be paid to the treatment of the sunk setup costs at contract termination. For services where multiple firm provision is efficient (e.g., lifeline service, TRS), the key is to preserve customer choice among alternative suppliers in order to promote efficient provision. There are various ways this can be achieved, including direct transfer of the subsidy to consumers through a voucher system or rebates to suppliers (as in the TRS scheme).

## **6. Productivity Offset**

The Commission solicits comment on whether and how to revise the productivity offset for the LEC price cap (NPRM, Baseline Issues 3a and 3b, para. 46). To lay the groundwork for recommendations, it is important to clarify certain key features that should

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<sup>28</sup> See Telecommunications Relay Services, and the Americans with Disabilities Act of 1990, CC Docket No. 90-571, Third Report and Order, FCC No. 93-357, (1993). The levy is applied to the gross interstate revenues of resale, cellular, access, PCS, packet-switched, WATS, video, telex, mobile radio, 800, 900, operator, MTS, private dedicated, international, satellite, and intraLATA service providers. There are two unappealing features of this scheme as a model for a universal service tax. First, self-supply by large end users is not subject to the levy. Since the tax required to fund universal service obligations may be substantial, this could introduce some bias in favor of internalisation by end users. Second, the tax is based on gross revenues rather than value added, which creates certain well-known distortions.



characterise a properly designed productivity offset. These are summarised briefly here.<sup>29</sup> First, the offset in the price cap reflects the differential between the rate of growth in **total factor productivity** (TFP) in the selected “yardstick” industry and the aggregate economy. The purpose of the productivity offset is to reflect the whole range of diverse factors that cause changes in the unit cost of production for LECs, apart from input prices. These determinants include technological advances that shift the production frontier, and changes in the levels and composition of demand that affect unit cost through economies of scale, scope, and density. TFP is the only correct productivity concept for the price cap because it alone measures changes in the overall efficiency of production.. All partial measures of productivity are inconsistent with the economics of price cap design because they are confined to particular outputs or inputs (e.g., the number of lines, or labour productivity)..

Second, efficiency gains (i.e., unit cost reductions) from economies of scale, scope, and density are an important source of TFP growth. Because competition in interexchange access services both reduces the level of demand for LEC services and changes its geographic and product composition, the appropriate productivity offset must reflect the extent and pattern of competitive incursion into LEC markets.

Third, the productivity offset should be based on an appropriate “yardstick” index of TFP growth and **not** be calibrated to match the actual performance of individual local exchange companies. To preserve efficiency incentives in the price cap and to prevent strategic behaviour aimed at influencing the productivity offset, the yardstick index must be insulated from the operational and investment decisions of individual firms. The most appropriate yardstick for the LEC price cap is an index of the growth in TFP for the local exchange industry. An alternative is to use a broader telecommunications industry index. This is not as good but it would be serviceable in my view, especially on a forward-looking basis as the process of technological convergence is completed.

Fourth, the productivity offset should be based on long run (trend) movements in TFP growth. Since annual TFP growth exhibits sharply procyclical behaviour, some

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<sup>29</sup> For more extensive discussion of these principles and price cap design, see California Public Utilities Commission’s (“CPUC”) New Regulatory Framework Review, A.92-05-002, Schankerman, Direct Testimony, pp. 13-25.

averaging must be done to remove (or smooth) these transitory variations.<sup>30</sup> The frequency with which the Commission updates the productivity offset is a separate issue discussed below.

Finally, the productivity offset should be based on “best practice” measurement of TFP using recent historical data. The Commission should reject the use of “forecasts” of technology and TFP to determine the offset because they are inconsistent with principles of price cap design. The Commission adopted price cap regulation to create “incentives similar to those in fully competitive markets” (NPRM, para. 12). In competitive markets, prices change when companies experience changes in their unit cost or demand. On the supply side, technological advances reduce prices only to the extent and at the time they actually reduce the unit cost of production (*i.e.*, raise the level of TFP). Forecasts of technology (and TFP growth) do not determine prices in a competitive market, and should play no role in the price cap.<sup>31</sup>

New technologies have in the past and will continue to offer the prospect of very substantial efficiency gains in the provision of voice and data communication services. However, trend TFP (which is the basis of the offset) grows at smoother and more moderate rates than the underlying technological developments themselves.<sup>32</sup> The

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<sup>30</sup> Annual movements in TFP do not represent long run changes in unit production cost, but rather changing utilisation rates over the business cycle due to quasi-fixed inputs like capital and skilled labor. For discussion in the price cap context and some summary evidence, see. California Public Utilities Commission’s (“CPUC”) New Regulatory Framework Review, A.92-05-002, Schankerman, Direct Testimony, pp. 13-25. There are more sophisticated statistical tools to extract estimates of trend TFP, but their use would inevitably introduce controversy and regulatory delay, and undermine transparency.

<sup>31</sup> Using forecasts of TFP is not only inconsistent with price cap design, it is impractical as well. Economists have had only moderate success providing empirically validated explanations of TFP movements retrospectively. Forecasting trend movements in TFP would be much harder, subject to unacceptable margins of error, and lead to protracted controversy.

<sup>32</sup> The reason is that many new technologies apply to specific parts of the network, and even for those with much broader impact the diffusion process takes time. The Commission recognized this point in the original price cap order (Policy and Rules

Commission does need to develop a mechanism to update the productivity offset to ensure that changes in trend TFP growth in the LEC industry and the aggregate economy are reflected in the price cap. This would allow the Commission to update the offset, if needed, without holding formal price cap reviews. The mechanism should be based on publicly available data and should adjust the offset only if the differential between the observed trend growth in TFP for the telecommunications industry and the aggregate economy. I recommend that the Commission seriously consider using the index of TFP for the telecommunications industry, still under construction by the Bureau of Labor Statistics (BLS), to compute trend TFP growth for the productivity offset. The BLS currently produces indices of TFP growth for the aggregate economy that can be used in conjunction with the index for the telecommunications industry.

The current offset should be based on the findings of the recent study of TFP in the local exchange industry, conducted by Christensen Associates under commission by the USTA.<sup>33</sup> The study is unique, and particularly relevant, in that it focuses exclusively on local exchange carriers. It utilises "best practice" techniques to construct an index of TFP for nine price capped local telephone companies for the post divestiture period 1984-1992. The study concludes that the average annual differential between LEC and economywide TFP growth for the period 1984-1992 is 1.7 percent. If the Commission decides to retain the consumer productivity dividend which it previously adopted, this yields a productivity offset of 2.2 percent. I support the adoption of this 2.2 percent offset for the LEC price cap. Besides being supported by the best available evidence, this offset would represent one useful step toward regulatory symmetry between the local exchange and cable television industries.<sup>34</sup>

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Concerning Rates for Dominant Carriers, Report and Order and Second Further Notice of Proposed Rulemaking, CC Docket No. 87-313, 4 FCC Rcd 2873 (1989).

<sup>33</sup> Laurits Christensen, Philip Schoech and Mark Meltzen, "Productivity of the Local Operating Telephone Companies Subject to Price Cap Regulation" (March 30, 1994).

<sup>34</sup> The Commission provisionally adopted a 2.0 percent offset for cable television, See Implementation of Sections of the Cable Television Consumer Protection Act of 1992: Rate Regulation and Adoption of a uniform Accounting System for Provision of

The Commission seeks comment on the frequency of price cap reviews (Transitional Issue 5, NPRM, para. 99). The appropriate interval between price cap reviews depends on other features of price cap reform adopted by the Commission. If the Commission addresses access reform and other urgent "transitional" issues at this time, as recommended in this paper, the price cap plan should be left in place for at least seven to ten years. Clear and stable rules of competition are needed for a period that corresponds, at a minimum, to the economic life span of capital equipment embodying new technology, and the time needed to develop and market new services and to realize the benefits of other productivity improving activities. This is necessary to enhance the credibility of regulatory commitment, to facilitate rational investment and other long range planning by LECs and competing providers, and to allow the efficiency incentives to work. Frequent price cap reviews would undermine all these objectives.

To summarise, my main recommendations are that the Commission should: (i) reset the current productivity offset at 2.2 percent, (ii) develop a mechanism to update the offset without the need for a full price cap review, (iii) review, with an eye toward adopting, the BLS index of TFP for the telecommunications industry as soon as it becomes available.

## **7. Sharing and Low-End Adjustment**

The Commission solicits comment on whether the sharing and low-end adjustment mechanisms should be revised or eliminated (NPRM, Baseline Issue 4b, para. 55). These mechanisms were designed originally as safeguards against an improper productivity offset (either too high or too low). With the benefit of four years of price cap experience and the recent "best practice" study of total factor productivity for the local exchange carriers (See Section 6), the Commission is now in a better position to determine an appropriate offset. The need for these particular safeguards is effectively removed. Moreover, there are substantial disadvantages associated with sharing (including the earnings ceiling) and the

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**Regulated Cable Service**, MM Docket No. 93-215 and CS Docket No. 94-28, (Released March 30, 1994,) at ¶ 320.

low-end adjustment. First, there can be no doubt that sharing reduces the efficiency incentives (rewards) that price caps were designed to provide. One recent study indicates that the reduction in incentives can be very large.<sup>35</sup> Second, these mechanisms shift the distribution of risk toward customers and away from the LECs. The consequence is greater variations in rates than would occur under a price cap without these mechanisms. Third, in order to implement sharing and the low-end adjustment, lower and upper trigger rates of return need to be computed. This reintroduces the thorny problems of rate base measurement, including appropriate capital depreciation policy for interstate services.

My recommendation is to eliminate both the sharing and the low-end adjustment mechanisms. This modification will enhance the efficiency incentives in the price cap, provide customers with more stable rates, and remove the need to measure the rate of return. Together with access reform as outlined in Section 4, this will reduce any risk of cross subsidisation between monopoly and competitive markets. The proposed access reform decouples price determination in monopoly and competitive markets in each service basket. With no role for trigger rates of return (*i.e.*, no indirect pricing link between these markets), the LEC will have no incentive for strategic cost allocation.

## **Concluding Remarks**

This paper discusses the economic principles that should guide regulatory reform for local exchange carriers. Recent technological developments and the associated intensification of competition have outgrown the existing regulatory framework. To realize the full social gains from these changes and to promote the development of a modern and cost-efficient telecommunications infrastructure, the Commission needs to undertake comprehensive regulatory reform. Above all else, the

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<sup>35</sup> See Strategic Policy Research, "Regulatory Reform for the Information Age" (January 11, 1994). This study estimates that the current FCC price cap plan for LECs provides less than 18 percent of the marginal efficiency incentives that exist under unregulated competition for a LEC that operates in the sharing zone each year.

regulatory framework must preserve the appropriate market price signals to induce efficient investment in this infrastructure.

There are two central recommendations in the paper. First, the Commission should base price cap reform on the principle of regulatory symmetry. Departures from symmetry should be adopted only in special cases where two conditions are clearly satisfied: (i) there is a substantial capability of incumbent firms to deter entry strategically (unrelated to any efficiency advantage), and (ii) there is no less costly way to redress the imbalance. The paper argues that it is neither necessary nor advisable to introduce asymmetric regulation in order to ensure against the possibility of preemptive investment, predatory pricing, vertical price squeeze, or cross subsidisation. Alternative regulatory mechanisms which do not distort market signals for investment and do not induce technical efficiency losses are discussed in the paper.

The second major recommendation is that the Commission should formulate the broader regulatory framework that will govern the transition to full competition at this time, as part of the price cap reform process, and not postpone it until competitive incursion expands. The entry and investment decisions of new firms and incumbents depend critically on the rules they expect to govern post-entry competition. The Commission must act now in order to prevent a socially inefficient pattern of investment based on distorted entry signals. This reform program should encompass access reform and the design of mechanisms to fund universal service obligations which are consistent with the principle of regulatory symmetry. The paper provides some guidelines in these areas.



**ATTACHMENT B**  
**STRATEGIC ALLIANCES AND MERGERS**



# VIDEO & INFORMATION SERVICE

Date	Company	Co. Type	Nature of Venture	Business Purpose	Venture Objective
1 1/89	GTE Telaps Apollo	LEC CATV	Joint Test	Video	Advanced video test bed
2 4/92	Cable of Louisiana Bell Atlantic Broadband Technologies	CATV RBOC Vendor	Joint Test	Video	Digital video trial similar to Time-Warner in Queens.
3 4/92	US West TCI AT&T	RBOC CATV Telecom	Joint Test	Video	Video on demand test conducted in Denver, CO.
4 11/92	Sammons Communications New Jersey Bell	CATV LEC	Customer - Vendor	Video	Video Dialtone
5 12/92	GTE Ventures Daniels Cable	Venture Co. CATV	Joint Provision	Video	Provide Main Street™ service to Carlsbad Calif. via Daniels Cable system
6 11/92	Ameritech Anderson Consul IBM	RBOC Consulting Computer	Joint Test	Video	Send video on demand programming via telephone facilities
7 11/92	IBM NBC NuMedia	Computer Network TV Software	Joint Test	Video	Video on demand via satellite to "cables" then to PC for accessing news clips. Pilot in New York City.
8	New York Tel Liberty Cable	LEC CATV	Video Dialtone	Video	Video switching and transport of up to 200 channels via fiber optic facility
9	Teleport Denver Mile Hi Cablevision	CAP CATV	Strategic Alliance	Video/Data	Teleport constructing downtown fiber in Mile Hi's right of way allowing both to reach downtown business district
10 12/92	New Jersey Bell FutureVision	LEC CATV	Lease	Video	Fiber facility to provide both video dialtone and voice service. FutureVision will compete w/CATV and possibly NJ Bell for VOD.
11 12/92	Rochester Telephone USA Video Corp.	LEC Technology Corp.	Test Market	Video	Rochester will coordinate LEC marketing. USA will provide "store and forward vision" video technology & interactive programming
12 12/92	General Instrument AT&T	Manufacturing Telecom	Joint Develop	Video	GIC a manufacturer of decoders jointly developed technique with AT&T to deliver 500 channels of digital video. TCI will adopt.
13	Comcast Liberty Media	CATV CATV	Purchase	Video	They are buying controlling interest in QVC home shopping. Lib. Media (TCI spin-off) is also purchasing HSN. Possible